- Animation: representations
  - Sequence of 3D meshes that represent the same object over time
- An animation could have:
  - Deformations (bending, etc)
  - Translations, Scaling
  - Merging of connected components
  - Topology changes
  - Increase/Decrease in detail, resolution
- Numbers
  - For each frame, we have to store
    - Connectivity
    - Geometry
  - We can use compression techniques

- Sampling
  - Interpolation vs. key frames
  - Choice of key fram given raw animation
    - Over regular interval
    - Over relative motion
      - Component movement
      - joint movement
  - Keep the animation smooth
    - Geomorphing

- Dynapack (’03)
  - Use prediction techniques that exploit space and time coherence
  - Lossless compression except for quantization
  - Fast
  - Only works with constant connectivity

- Extended Lorenzo Predictor (ELP)
  - Parallelogram predictor
  - Perfect for translations
  - Not good for rotation and scaling

- Improving ELP
  - Coefficient based approach
    - Make use of local coordinate system
    - The set of coefficients remain the same
  - Replica solution
    - Use the normal of the original plane does not work
      - Rotation in next frame is not captured
      - Losing information
    - Normal grows too fast, need to be scaled back
    - Translation, rotation and scaling are taken care of after correction

        - However, improvement is not significant in tests

- Barycentric coordinates
    - Extend to 3D
        - Use volume of a tetrahedron

- Jed Lengyel's approach ('99)
    - Problems
        - Lost of generality
        - How to identify the set of vertices that go together?
            - May change overtime

- Marc Alexa's Approach ('00)
    - Use the animation as a whole new dimensional space
    - All the frames together in a huge matrix, decompose with PCA
        - Principle component analysis
            - Typical dimensionality reduction technique
            - Finds projections where data creates most variance
            - Good for reconstruction
                - Lossy compression
                - Useful for progressive transmission
            - Problem
                - Computationally expensive
                - Hard to control error level

- Geometry Images
    - Take advantage of image techniques to do animation compression

- Research in Dynapack
    - New features:
        - Simplification of the animation
        - Geomorphs, new prediction
        - Segmentation
        - Animation Simplification

- How to simplify an animation
    - Frame by frame
        - Loss of coherence
    - Identify moving components
- Hard